

**United States Department of the Interior  
Geological Survey**

**Mineral Resource Potential of the Unaka Mountain  
RARE II Area, Unicoi County, Tennessee**

by

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This report is preliminary and has not been reviewed  
for conformity with U.S. Geological Survey editorial  
standards and stratigraphic nomenclature.

## **STUDIES RELATED TO WILDERNESS**

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and the Joint Conference Report on Senate Bill 4, 88th Congress, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Unaka Roadless Area, Cherokee National Forest, Unicoi County, Tennessee.

### **SUMMARY**

Unaka Mountain Roadless Area comprises 7.3 square miles in the Cherokee National Forest, Unicoi County, Tennessee. The clastic Chilhowee Group of early Cambrian age, including the Erwin, Hampton, and Unicoi Formations, underlies 98 percent of the study area. Precambrian granite, schist, and gneiss crop out in the southeast corner. Few known iron or manganese prospects or mines occur within the study area.

Neither geologic nor geochemical data indicate much mineral resource potential for the Unaka Mountain Roadless Area. Small manganese deposits may be present in the area of rocks of the Chilhowee group and, as a speculative possibility, copper deposits might be present in the same rocks. The potential is low for either type of deposit.

### **INTRODUCTION**

Unaka Mountain Roadless Area is on the north side of Unaka Mountain in northeastern Tennessee about 2 1/2 miles south of Stone Mountain. The Tennessee and North Carolina state line roughly parallels the southern border of the Roadless Area. Access to the area is primarily by dirt roads and trails. Relief is moderate to steep and vegetation is thick in most places.

### **GEOLOGY AND GEOCHEMISTRY**

The clastic rocks of the Chilhowee Group of early Cambrian age underlie about 98 percent of the Unaka Roadless Area. Granite, schist, and gneiss of Precambrian age underlie the other 2 percent of the area.

The Chilhowee Group is made up of three formations. The lowest, the Unicoi Formation, is largely quartzite, in part arkosic. The middle, the Hampton Formation, is predominantly shale with interlayered siltstone and quartzite. The quartzite tends to be arkosic in the lower part of the formation and vitreous in the upper part. The uppermost formation in the group is the Erwin Formation, which is mainly quartzite with subordinate siltstone and shale.

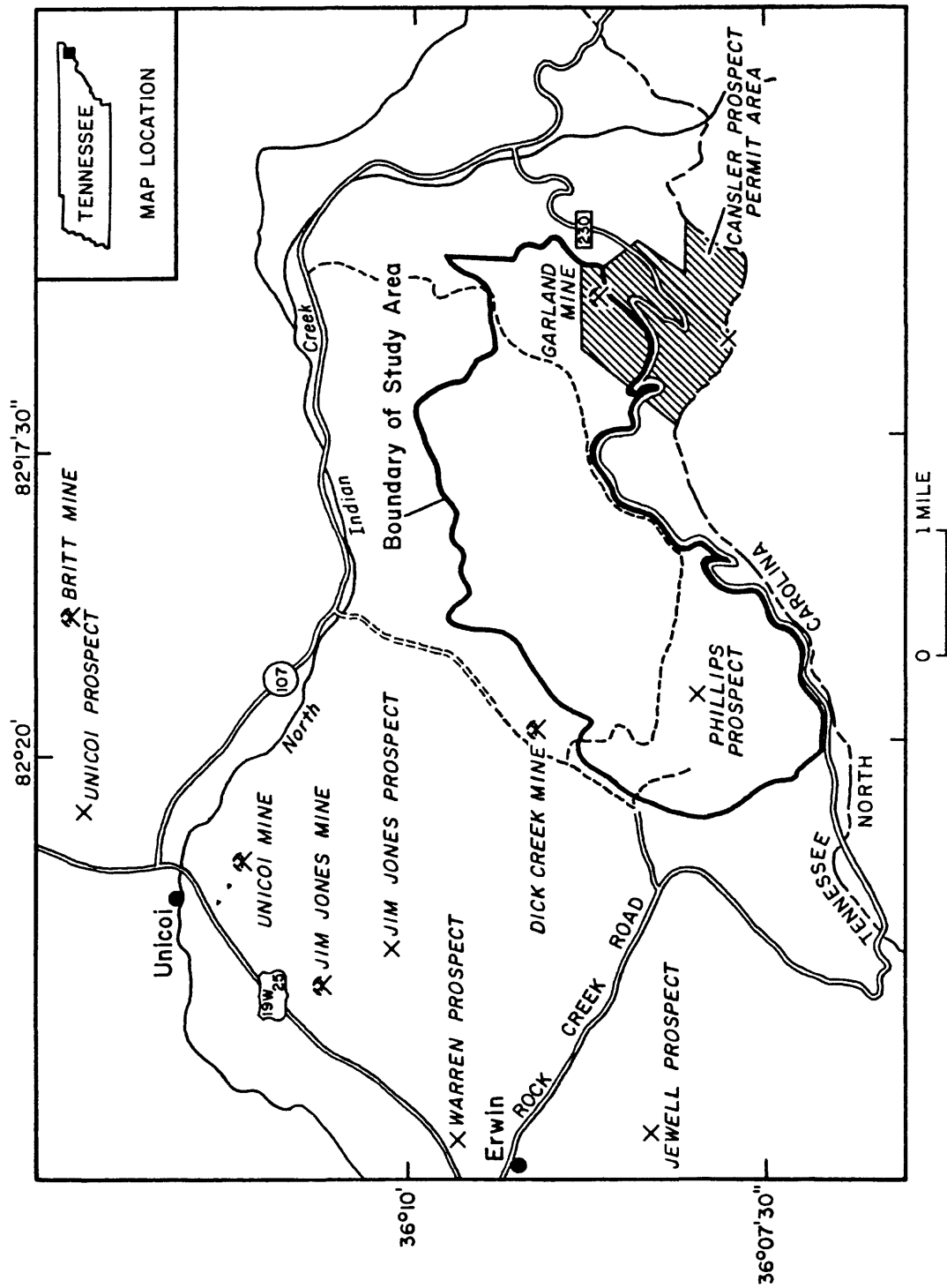


Figure 1.--Location and mineral resource potential for the Unaka Mountain Roadless Area, Unicoi County, Tennessee. Entire study area has low mineral resource potential.

## Present Field Investigation

M. L. Dunn, Jr., J. G. Jones, and M. L. Chatman of the Bureau of Mines examined the Roadless Area in April, 1981, collecting 12 bulk rock samples from outcrop, 3 iron-manganese samples from mines and prospects and 14 heavy-mineral concentrates from area streams. All rock samples were tested with a 42 element semiquantitative emission spectroscopy scan, fire assay-atomic absorption analysis (FA-AA) for silver and gold, and atomic absorption tests for 8 other metals. Additional analyses were for uranium (fluorometric) and thorium (radiometric). Heavy-mineral concentrates were evaluated by the emission spectroscopy scan; 3 concentrates from the Cansler prospect were tested for gold and silver by FA-AA. Analyses were performed by TSL Laboratories Ltd. of Spokane, Washington.

K. A. Duttweiler, J. W. Whitlow, and W. R. Griffiths of the U.S. Geological Survey made a geochemical study of the Roadless Area in the spring of 1980. Heavy minerals were concentrated from sediments of the streams, divided magnetically into several fractions, and analysed by emission spectrography by E. F. Cooley in the Geological Survey laboratory.

## SURFACE AND MINERAL OWNERSHIP

Surface and mineral rights of the Unaka Mountain Roadless Area are owned by the Federal Government. A gold and silver prospecting permit that expired July 1, 1982, included 249 acres in the study area. No portion of the area has been leased for oil and gas exploration.

## MINES AND PROSPECTS

The study area is about two miles south of the Unicoi manganese-iron mining district of Tennessee where mineralization is in residual clays of the upper Chilhowee and the Shady dolomite (King and others, 1944; Maher, 1964). Deposits in the Unaka Mountain area are fracture-related concentrations in the lower Chilhowee which are not considered a part of the Unicoi district. The Phillips manganese prospect is in the study area and the Dick Creek iron mine is about 1200 feet outside of it; neither appears to contain extensive mineralization. A third site of mineral activity in the study area, the Garland mine, was reported to have been worked for silver. These sites were recently mapped and sampled; analyses and descriptions reported here are from Chatman (1982).

### Phillips Prospect

The prospect consists of a 25 foot wide open cut on a steep slope above Rock Creek. The ore minerals are in a fracture zone over an impervious quartzite of the Unicoi Formation. Dump material consists of siliceous iron and manganese oxides; a select sample assayed 61.0 percent iron, 2.1 percent manganese, and 0.19 percent phosphorus. The deposit probably does not extend for more than 100 feet in any direction. A report of an earlier examination when fresh exposures were still available (U.S. Bureau of Mines, 1950) noted hematite, psilomelane, and pyrolusite in the cut, and described several prospect shafts, up to 8 feet deep, on the slope below the main cut. These shafts are no longer visible. A channel sample collected at that time contained 57.4 percent iron and 2.5 percent manganese.

## **Garland Mine**

Workings are in a friable medium-grained sandstone in the lower part of the Chilhowee group, and consist of an open cut about 90 feet long with a 15-foot-high face. An 11-foot-long adit was driven into the same ridgecrest nearby. Both openings intersect a 2- to 3-inch-thick blue-gray clayey fracture filling that contained 0.018 oz/ton silver. A sample of wallrock contained 0.045 oz/ton silver. These silver assays did not exceed background values for other rocks in the study area.

## **Cansler Prospect**

F. G. Cansler of Midway, Tennessee, held a gold and silver prospecting permit (#ES-18442) through July 1982 on a 785-acre tract. About 249 of those acres are inside Unaka Mountain Roadless Area. Bulldozer cuts were made several years ago at Low Gap, about 3000 ft south of the Roadless Area, in search of silver. Interest by prospectors is based on historical references to silver rather than geologic investigation. Spectrographically determined silver values did not exceed 0.052 oz/ton in pan concentrates taken from streams draining the prospect and no gold was detected.

## **Dick Creek Mine**

The iron mine on Dick Creek, about 1200 feet north of the Roadless Area was probably opened in the late 1800's when iron was mined in the nearby Unicoi district (Maher, 1964). Mineralization was probably fault controlled and is near the contact of the Erwin and Hampton Formations. Dump material on the site is a siliceous limonite with 55.0 percent iron, 0.15 percent manganese, and 0.45 percent phosphorus. Workings consist of two open cuts, the largest measuring 90 feet by 30 feet and up to 30 feet deep. Several shallow test pits were dug on a northeast trend which extends downslope from the mine. There is no evidence of extensive production.

## **Mineral Resources**

No mineral deposits of current economic significance are known to be in the Unaka Mountain Roadless Area. The known manganese and iron deposits are too small to be mined now and the reported silver mineralization was not confirmed. Cobalt, a component of some Appalachian manganese ores, has not been found in important amounts in the Unaka area. Oil, gas, copper and uranium are speculative resource possibilities. The evidence for deposits of those materials is permissive rather than affirmative.

## **Oil and Gas**

Seismic-profile interpretations suggest that hydrocarbons may exist in portions of the Blue Ridge (Cook and others, 1979; 1980), but the Unaka Mountain area has not been tested for oil and gas possibilities. As of February, 1982, no oil and gas leasing activity has occurred in the Unaka Mountain area, and little interest exists in other parts of the Blue Ridge of northeasternmost Tennessee. The potential for petroleum in the small Unaka Mountain Roadless Area itself is small.

## **Silica Sand**

Nearly 90 percent of the study area is underlain by sandstone, conglomerate, and quartzite of the Unicoi Formation. High levels of impurities preclude any use of the formation for silica.

## **Uranium**

Cranberry Gneiss is exposed over 2 percent of the study area. The gneiss has a high background radioactivity; scintillometer readings for the formation inside the roadless area are about 30 percent higher than those obtained for the adjacent Unicoi Formation. No localized areas with unusually high radioactivity were found in this investigation. Analysis of four Cranberry Gneiss samples showed no more than 3 parts per million uranium and no thorium (Chatman, 1982).

## **Manganese and Iron**

Known occurrences of manganese and iron in the study area are small. The siliceous mineralized zone at Phillips prospect and Dick Creek mine are probably restricted to fractures. Deposits of this type in this region, described by Chance (1909) and Keith (1907) are considerably smaller than the more widespread "residual ores" found in the nearby Unicoi mining district (King and others, 1944) and therefore have little potential for development.

## **Copper**

The moderate contents of barium, copper, and zinc in a few heavy-mineral-concentrate samples from creeks in the region draining the rocks of the Chilhowee group suggest that those rocks may contain sedimentary "red-bed"-type copper deposits. Because this is a speculative possibility, the area of the Chilhowee group is classed as one with low mineral potential, most likely for copper, less likely for uranium, which is associated with some "red-bed" copper deposits.

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